
A New Species of *Dubautia* (Asteraceae–Madiinae) from Kaua‘i, Hawaiian Islands

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ABSTRACT. *Dubautia syndetica* G. Carr & Lorence from the Hawaiian Island of Kaua‘i is described and illustrated. The new species is distinguished from congeners on the basis of its combination of uniseriate, somewhat coalescent receptacular bracts, coarsely glandular peduncles, glandular corolla tubes, and conspicuously strigose achenes. These and other features suggest a possible hybrid origin from *D. laxa* Hooker & Arnott subsp. *hirsuta* (Hillebrand) G. Carr and *D. raillardoides* Hillebrand.

The most recent monograph of the Hawaiian endemic genus *Dubautia* (Carr, 1985) recognized 21 species in three sections: *Dubautia* sect. *Dubautia*, consisting of 10 species of diverse, mostly mesophytic shrubs and small trees with 14 pairs of chromosomes; *D. sect. Raillardia* (Gaudichaud) G. Carr, consisting of 10 species of mostly xerophytic shrubs and small trees with 13 pairs of chromosomes; and *D. sect. Venoso-reticulata* (A. Gray) G. Carr, comprising a single lianous species with 14 pairs of chromosomes. These species, together with those of the Hawaiian genera *Argyroxiphium* and *Wilkesia*, constitute the Hawaiian Madiinae (Asteraceae), a group of 28 morphologically and ecologically highly diverse, yet closely related species otherwise known as the Hawaiian silversword alliance. This group of plants has been the subject of more than 20 years of intensive experimental studies, including investigations of biosystematics and cytogenetics (Carr et al., 1989; Kyhos et al., 1990; Carr et al., 1996), flavonoid chemistry (Crins & Bohm, 1990), physiological ecology (Robichaux et al., 1990), population genetics (Friar et al., 1996; Witter, 1990; Robichaux et al., 1997), phytogeography (Baldwin & Robichaux, 1995), and molecular systematics and evolution (Baldwin et al., 1991; Baldwin, 1997). As illuminated by the aforementioned experimental studies and the earlier anatomical and morphological observations summarized by Carlquist (1970, 1974), the silversword alliance provides a premier example of the process of adaptive radiation in plants.

While synthesis of information regarding comparatively well-known species of the silversword alliance has been the focus of several workers, leading field botanists in the Hawaiian Islands continue to discover species new to science. A collection in 1985 by Tim Flynn, Curator of the Herbarium at the National Tropical Botanical Garden, first called attention to the species described herein. Flynn's specimen from the Wahiawa Mountains of Kaua‘i was thought to represent a single plant growing at a single site in the vicinity of *Dubautia laxa* and *D. raillardoides*. For this reason, and because the material seemed to combine features of these species, it was annotated by one of us (GDC) as a hybrid. A few years later, field botanists began to detect plants with the same unique suite of characters in other areas of the Wahiawa Mountains, and often not closely associated with other species of *Dubautia*. Subsequently, the authors visited the site together and found no evidence that these plants represent primary or recent hybridization. Although we hypothesize a hybrid origin for this taxon, it appears to be as reproductively stable as any normal sexual species, and therefore worthy of formal recognition.

Dubautia syndetica G. Carr & Lorence, sp. nov.

TYPE: Hawaiian Islands (U.S.A.). Kaua‘i: Koloa District, Lihue-Koloa Forest Reserve, Wahiawa Stream and Mts. along main Wahiawa Stream near headwaters, low wet forest, 705–710 m, 13 June 1991, *D. H. Lorence, T. Flynn, K. Wood & S. Perlman* 6782 (holotype, BISH; isotypes, F, HAW, MO, NY, PTBG, US). Figure 1.

A speciebus aliis *Dubautiae* sectionis *Dubautiae* bracteis receptaculi uniseriatis nonnihil coalescentibus, pedunculis grosse glandulosis, tubo corollae glanduloso, acheniis insigniter strigosis differt.

Openly branching shrubs 1–2(–3) m tall, vegetative stems glabrous to sparsely hispidulous, mostly pale, gray-brown when dry, the leaf scars mostly glabrous; flowering stems usually hispid. Leaves opposite, commonly 4–16 cm long, 1–3.5 cm broad,

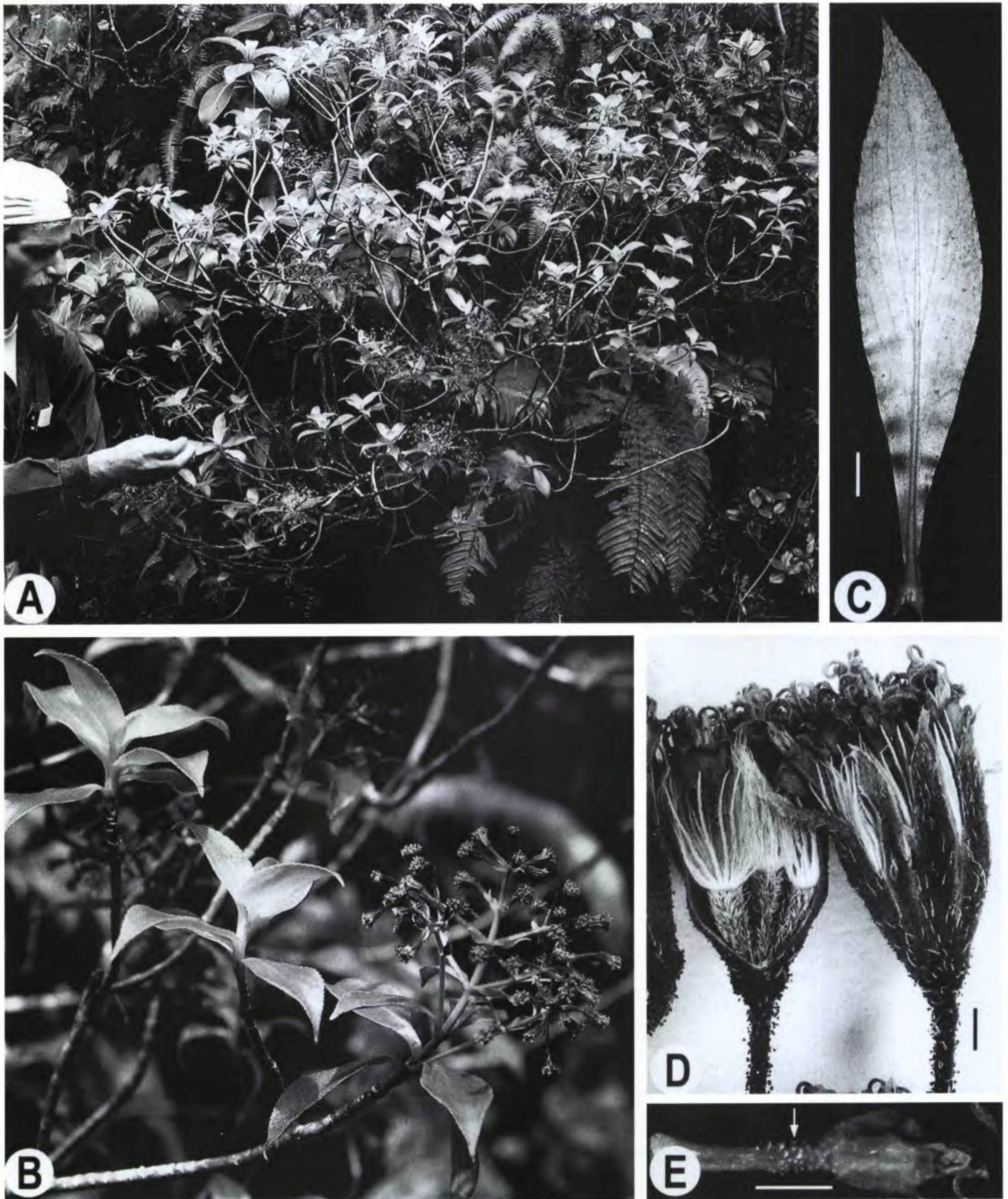


Figure 1. *Dubautia syndetica* G. Carr & Lorence. —A. Habit and habitat of plant on steep bank. Lorence *et al.* 6782. —B. Vegetative and reproductive shoots. Note the short, broad capitulescence. Lorence *et al.* 6782. —C. Leaf, lower surface. Note 7 acrodromous veins. Morden *et al.* 1384. —D. Flowering heads. Note uniseriate, weakly fused peripheral receptacular bracts on the head at right, exposed, strigose achenes in the partially dissected head on the left, and coarse glands on the peduncles. Lorence *et al.* 6782. —E. Disk corolla. Note the glands in the middle region of the tube (arrow). Lorence *et al.* 6782. Bars = 1 cm in C, 1 mm in D, E.

narrowly elliptic to oblanceolate, dark green and sparsely to moderately appressed-hispidulous above, paler and appressed-hispidulous to somewhat more coarsely and spreading-hispid beneath; margins shallowly toothed from apex to well below

the middle, often ciliolate basally; apex acuminate; base attenuate-petioloid; venation \pm acrodromous, with mostly (5–)7 basal to suprabasal veins. Heads commonly 10–90, disposed in cymose-corymbiform, sublax capitulescences mostly 2.5–9 cm long

and 3–15 cm broad, the lower peduncles puberulous to hispid and sparsely glandular, becoming more glandular above, the upper and ultimate peduncles often obscured by purplish, sessile to short-stalked glands, the ultimate peduncles mostly 2–15 mm long; receptacular bracts 6–13, linear to linear-elliptic, linear-lanceolate or rarely linear-ob lanceolate, peripheral, uniseriate, weakly and irregularly coalescent (usually partially or wholly separating on drying), 4.5–7 mm long, usually reddish purple, often sparsely hispid and glandular, especially toward the base; florets usually 8–17, the corolla pale greenish yellow, becoming purple in age, 2.2–3.8 mm long, about equaling the pappus, sparsely to moderately glandular on the tubular portion, rather abruptly dilated distally, apex with 5 triangular lobes, each ca. 0.5 mm long; pappus stramineous to pale tan or reddish purple, comprising 16–26 unequal, very narrowly linear-lanceolate, shortly fimbriate aristae 2.2–3.8 mm long; achenes black, straight or only slightly curved, ca. 2–3 mm long, strigose.

Distribution. This taxon is known only from the region of the headwaters of the Wahiawa Stream, primarily on adjacent slopes of the Wahiawa Mountains draining into the northern end of the Kanaele Swamp basin. The known range is roughly a triangular area approximately defined by Hulua in the southwest, Kapalaoa in the north, and Kahili in the southeast. Populations occur at elevations of ca. 680 to 950 m. Based on rather limited phenological data, flowering appears to occur primarily from March to June.

Habitat. *Dubautia syndetica* occurs as scattered to locally abundant individuals along the banks of the upper reaches of the Wahiawa Stream and its tributaries, and adjacent windward slopes leading to the summit of Kapalaoa. The vegetation is a low stature, diverse lowland wet forest dominated by *Metrosideros polymorpha* Gaudichaud, *M. waialealae* (Rock) Rock, *Antidesma platyphyllum* H. Mann var. *hillebrandii* Pax & K. Hoffmann, *Syzygium sandwicensis* (A. Gray) Niedenzu, *Ilex anomala* Hooker & Arnott, *Perrottettia sandwicensis* A. Gray, *Tetraplasandra* spp., *Cheirodendron* spp., and *Psychotria* spp. with numerous pteridophytes including *Dicranopteris linearis* (N. L. Burman) Underwood, *Diplopterygium pinnatum* (Kunze) Nakai, *Athyrium* sp., *Diplazium* sp., *Sadleria* spp., and *Cibotium* spp. Threats include invasion by alien plant species, notably *Psidium cattleianum* Sabine, *Melastoma candidum* D. Don, and *Rubus rosifolius* Smith, and landslides. Associated *Dubautia* species include *D. imbricata* St. John &

G. Carr subsp. *imbricata*, *D. laxa* subsp. *hirsuta*, *D. paleata* A. Gray, *D. pauciflorula* St. John & G. Carr, and *D. raillardioides*.

Affinities. This new species belongs to *Dubautia* sect. *Dubautia*, characterized by mesomorphic leaves lacking a distinct petiole, blades not visibly reticulate or with areolae obviously longer than broad, and pappus paleae or aristae laciniate-fimbriate or minutely ciliate with fimbriae or cilia less than 0.4 mm long. *Dubautia syndetica* was first thought to represent an isolated primary hybrid between *D. laxa* subsp. *hirsuta* and *D. raillardioides*. Indeed, several features of the new species suggest this origin. For example, it combines the peduncular glands found in *Dubautia raillardioides* with the corolla glands found in *D. laxa* subsp. *hirsuta*. Other features of *Dubautia syndetica*, including the color, shape, distribution, texture, and coalescence of the receptacular bracts, the color and texture of the pappus, the indumentum of the peduncles, leaves, and achenes, and the general habit of the plants, also appear to be intermediate to the corresponding features of *Dubautia laxa* subsp. *hirsuta* and *D. raillardioides*.

While many features of *D. syndetica* appear intermediate to the putative parental species, leaf venation is very similar to that of *D. laxa* subsp. *hirsuta*, and leaf size (especially on flowering shoots) is smaller than might be expected in the hypothesized hybrid combination. In any case, the frequency and distribution of plants in the field are indicative of a reproductively stabilized taxon, not a series of primary F_1 hybrids. Thus, formal taxonomic recognition is desirable. The specific epithet, derived from the Greek *συνδευτικός* (binding together), recalls the striking combination of features of two other species of *Dubautia*, and bespeaks the putative hybrid nature of this taxon.

Paratypes. HAWAIIAN ISLANDS (U.S.A.). **Kaua'i:** Koloa District, Kanaele Swamp drainage, along main fork and upper tributaries of Wahiawa Stream to crest of ridge just SW of Kapalaoa, 670–975 m, 13 Apr. 1991, *Flynn et al.* 4589 (BISH, PTBG), 700 m, 1 June 1995, *Morden et al.* 1380, (BISH), 715 m, 1 June 1995, *Carr et al.* 1501 (BISH, HAW); Wahiawa Stream drainage, SW of Kapalaoa, 730–850 m, 20 Apr. 1991, *Flynn et al.* 4625 (PTBG); W side of Wahiawa Stream drainage, gulch between Lone Loulu Ridge and LZ1, 700–770 m, 23 July 1991, *Wood et al.* 1085 (PTBG); Wahiawa Mts. just NE of Wahiawa Bog, along main Wahiawa Stream, NW of Mt. Kahili, 630–740 m, 12 Apr. 1988, *Lorence et al.* 5962 (PTBG); ESE of main Wahiawa Stream heading up 2 unnamed gulches to ridge connecting Kahili and Kapalaoa Peaks, 29 Jan. 1991, *Lorence et al.* 6694 (BISH); on windward side of ridge between Relay Towers and Mt. Kahili, ca. 685 m, 6 June 1985, *Flynn* 1116 (BISH, PTBG); Lihue District, Kapalaoa Peak, windswept ridge, 915–930 m, 15 May 1991, *Wood et al.* 840-C (PTBG).

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